

EXECUTIVE SUMMARY

The State of Hawaii Department of Land and Natural Resources in cooperation with the Department of Business, Economic Development and Tourism, and Hawaiian Electric Company sponsored a study to improve the understanding of the issues related to construction and operation of a Pumped Storage Hydroelectric facility on Oahu. Pumped Storage Hydroelectric is a well established technology with many operating facilities worldwide. These facilities provide electrical generating capacity during peak power demand on the electric utility by releasing stored water in an upper reservoir through generators to a lower reservoir. The water that is stored in the upper reservoir is initially pumped there from the lower reservoir during off-peak utility demand periods.

Pumped storage hydroelectric generation is included as one of a number of established generating technologies in the Integrated Resource Planning work that is being performed by Hawaiian Electric Company. In support of that work this study focused on two specific sites (located as shown on figure ii-1) for a pumped storage hydroelectric facility;

1. Koko Crater as the upper reservoir with the lower reservoir formed by the adjacent ocean area enclosed by a pervious breakwater, using salt water as the working fluid. Figure ii-2 is an artist concept of the dam at the Koko Crater, and Figure ii-3 is an artist enhanced photograph of a salt water pump storage hydroelectric project on Okinawa. The Koko Crater project will be similar to it.

2. Kaau Crater as the upper reservoir with a lower reservoir in Maunawili Valley using fresh water as the working fluid.

The objective of this study is to determine the feasibility of installing a pumped storage hydroelectric facility at either site and to select one site for further consideration.

Both sites were sized for a nominal electrical output of 160 megawatts of generation for a period of 6 hours and a pumping period of 8 hours. The generating/pumping cycle would be repeated daily, seven days a week. In the Kaau Crater/Maunawili project the reservoirs would hold approximately 455 million gallons of fresh water; Koko Crater would hold approximately 1,220 million gallons of salt water. Each facility would cost approximately \$250 million and require about 7 years of construction.

While both sites have significant environmental issues associated with development of a pumped storage hydroelectric facility, the Kaau Crater/Maunawili project would have far more significant impacts. The most significant issues are the following;

Koko Crater Project

- Public concerns about the safety of the reservoir dam.
- Affects on the marine environment by the breakwater structure.
- Relocation of the Botanical Garden and use of the crater park.
- Routing of the transmission line from the crater.
- Visual impact of the reservoir dam.

Kaau Crater/Maunawili Project

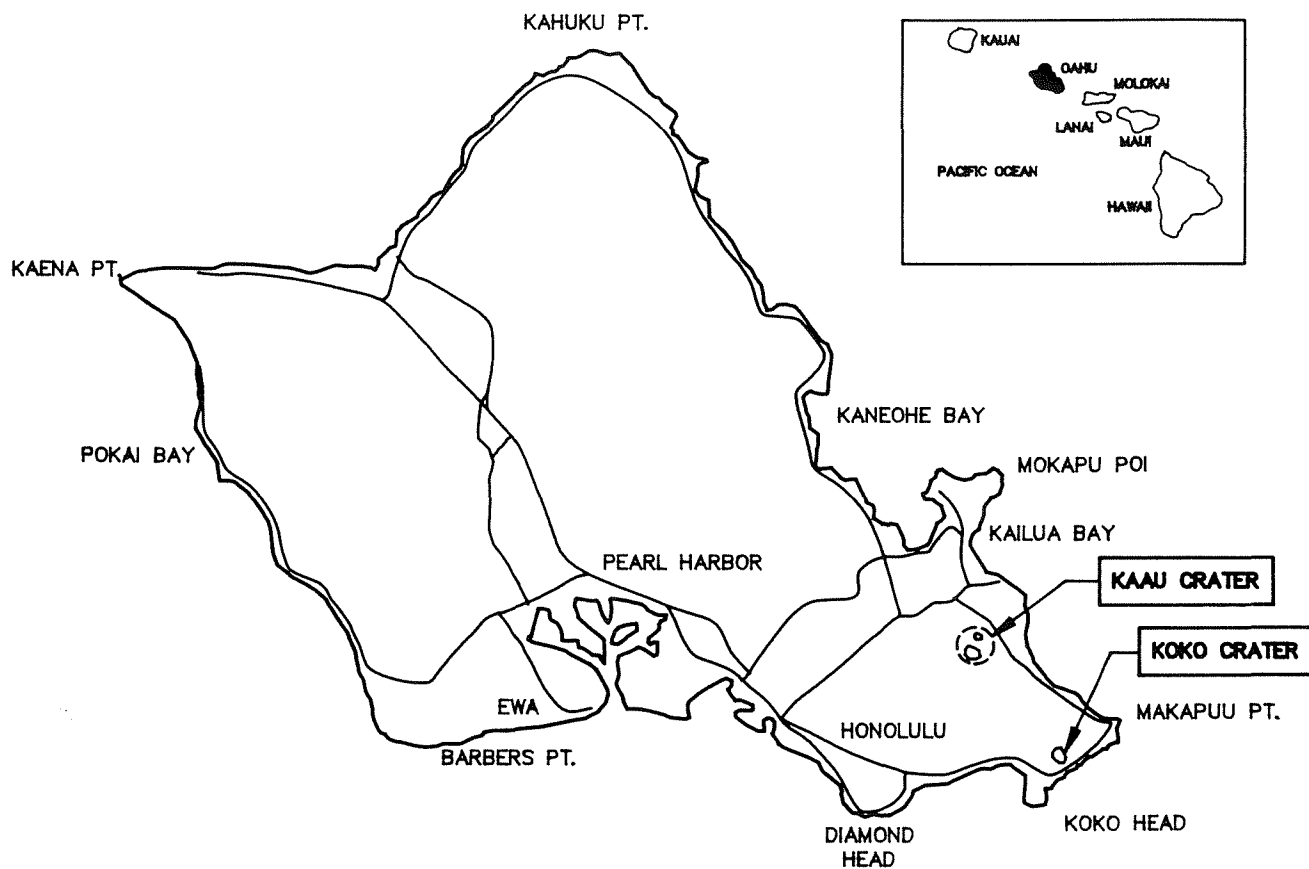
- Replacement of the Kaau Crater wetlands with a fresh water reservoir.
- Disruption of water flow into the Maunawili Ditch and Kawainui Marsh and

inundation of portions of the Maunawili Ditch with a fresh water reservoir.

- Impact on many acres of habitat on the lower slopes of the Koolaus.
- Visual and environmental impact of the access road to Kaau Crater from Palolo Valley.
- Public concerns about the safety and visual impact of the reservoir dam.
- Relocation of the banana farmers in Maunawili Valley.
- Potential disruption of archaeological sites.

The study concluded that both projects were technologically and economically feasible; however, the environmental impacts, with no evident mitigation measures, of the Kaau Crater/Maunawili project caused this project to be eliminated from further consideration. The Koko Crater project, however, appears to have reasonable mitigation measures available to make this project environmentally feasible.

This report provides only an elementary understanding of the construction, environmental and economic issues related to pumped storage hydroelectric on Oahu. Therefore, it is recommended that additional work be performed including 1) the preparation of an Environmental Assessment to better define the environment of the Koko Crater and the adjacent ocean area, and to address the technical, social, safety and economic issues; and 2) geotechnical field work to characterize the structure of the crater and the ocean floor adjacent thereto.



ISLAND OF OAHU
NOT TO SCALE



PROJECT SITE LOCATION

FIGURE II-1



KOKO CRATER RESERVOIR

UPPER RESERVOIR

BREAKWATER INLET

OKINAWA PUMPED
STORAGE HYDROELECTRIC PROJECT